



INTERNAL USE ONLY

PUMA GT2100 series

New Generation Global Standard 8" & 10"
chuck size Turning Center with 2axis or
Milling

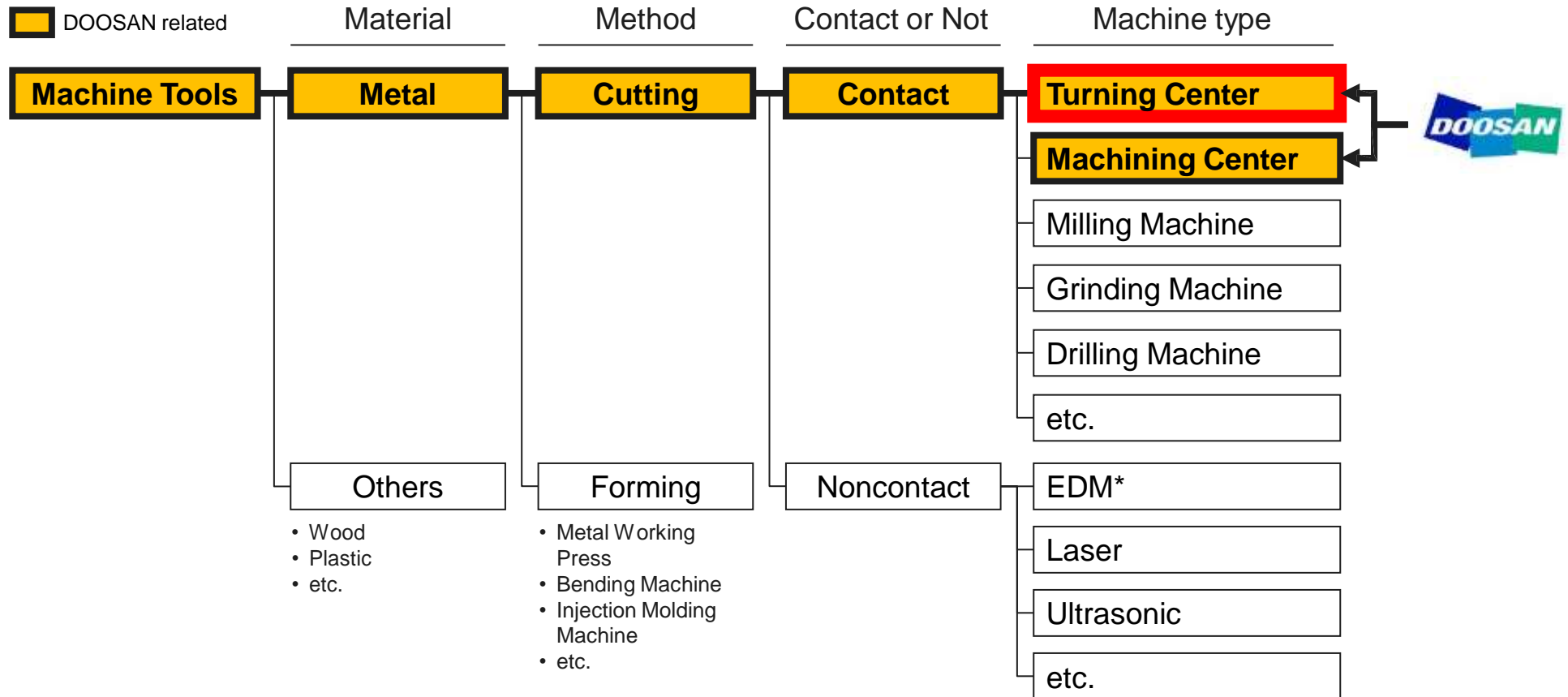


January 2014
Doosan Infracore
Machine Tools BG

Doosan Machine Tools

Optimal Solutions for the Future

- Full line-up: Small size TC to Large size NC Bor. & DCM
- Full function: 2 axis to Y axis, Multi tasking and 5 axis
- Full application: Bar feeder, Steady rest, Rotary table and etc.









* Electrical Discharge Machine

- **Turning Center**

- **Horizontal TC**
- Vertical TC
- Swiss turn type TC

- **Machining Center**

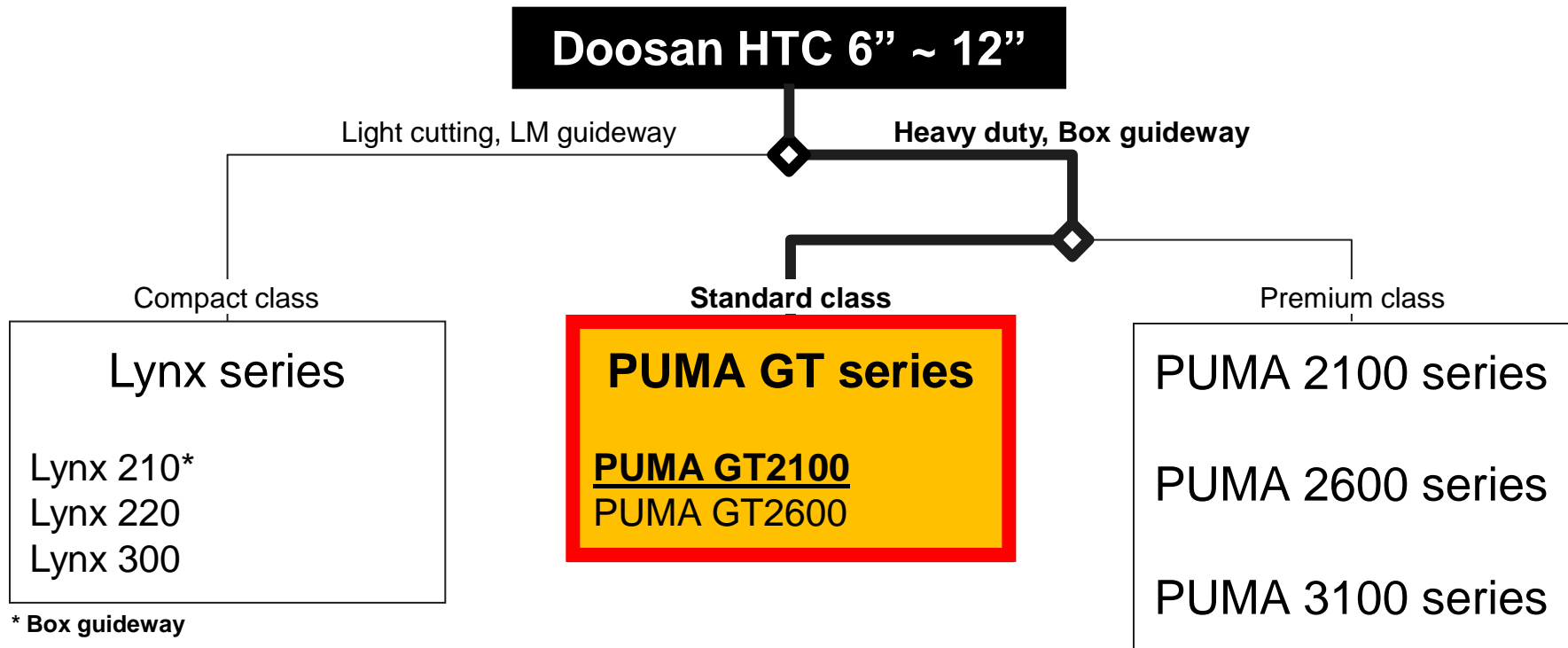
- Vertical MC
- Horizontal MC
- NC Boring Mill
- Double Column MC

Chuck size (inch)	Small size HTC		Medium size HTC	Large size HTC	Multi-tasking HTC		Twin turret HTC		2spindle HTC	Aluminum Wheel turn HTC
	Lynx series	PUMA GT series	PUMA series		PUMA SMX series	PUMA MX series	PUMA TT series	PUMA TL series	PUMA HT/QL series	PUMA AW series
										
6	Lynx 210 Lynx 220A					MX1600	TT1500		HT230T	
8	Lynx 220B Lynx 220C	GT2100	PUMA 2100			MX2100	TT1800 TT2000	TL2000	H250T QL200H	
10	Lynx 300	GT2100B GT2600	PUMA 2600		SMX2500	MX2600	TT2500	TL2500	H310T QL300H	
12			PUMA 2600B PUMA 3100	PUMA 400A	SMX3100	MX3100				
15				PUMA 400B						
18					PUMA 600					
21				PUMA 400C PUMA 480						
24					PUMA 700					
32					PUMA 800					
Big bore				PUMA 480D (275mm)	PUMA 800B (375mm)					

Wheel
dia.

AW560(20")
AW660(24")

Concept...



PUMA GT2100 series _ Product line-up / Designation

Function									
Chuck size (inch)	Bar working dia. (mm)	Max. turning dia. (mm): 2ax/M	Max. turning length (mm): 2ax/M	2 axis	M	S	MS	Y	SY
				X/Z axis	2 axis + Milling	2 axis + Sub spindle	2 axis + Milling + Sub spindle	2 axis + Milling + Y axis	2 axis + Milling + Y axis + Sub spindle
8	65	390/300	562/513	PUMA GT2100	PUMA GT2100M	PUMA 2100S PUMA 2100LS	PUMA 2100MS PUMA 2100LMS	PUMA 2100Y PUMA 2100LY	PUMA 2100SY PUMA 2100LSY
		480/406	520	PUMA 2100	PUMA 2100M				
		760	PUMA 2100L	PUMA 2100LM					
10	81	390/3		PUMA GT2100B	PUMA GT2100MB	PUMA 2600S PUMA 2600LS	PUMA 2600MS PUMA 2600LMS	PUMA 2600Y PUMA 2600LY	PUMA 2600SY PUMA 2600LSY
		460/4		PUMA GT2600	PUMA GT2600M				
		460/4		PUMA GT2600L	PUMA GT2600LM				
	76	PUMA 2600/500		PUMA 2600M/500					
		PUMA 2600		PUMA 2600M					
		PUMA 2600L		PUMA 2600LM					
12	102	400/3	PUMA 300C	PUMA 300MC	PUMA 2600SB PUMA 2600LSB	PUMA 2600MSB PUMA 2600LMSB	PUMA 2600YB PUMA 3100Y PUMA 3100LY PUMA 3100XLY PUMA 3100ULY	PUMA 2600SYB PUMA 2600LSYB	
			PUMA 300LC	PUMA 300LMC					
		480/3	PUMA 2600B	PUMA 2600MB					
			PUMA 2600LB	PUMA 2600LMB					
			PUMA 3100	PUMA 3100M					
			PUMA 3100L	PUMA 3100LM					
			PUMA 3100XL	PUMA 3100XLM					
			PUMA 3100UL	PUMA 3100ULM					
		525/4							

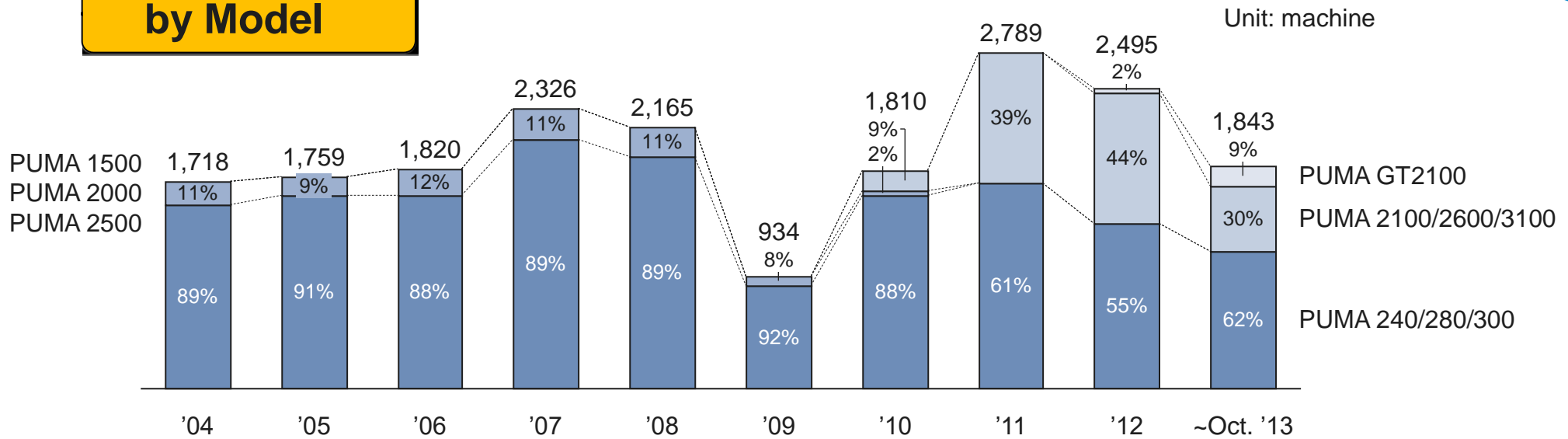
PUMA GT2100M

- [Suffix & Application] **M** : Milling, **B** : Big bore, 10inch chuck size, **L** : Longer Z axis travel
- [Nominal Size Chuck size] **2100** : 203mm (8inch), **2600** : 254mm (10inch)
- PUMA** : Brand, **GT** : Global Turning center

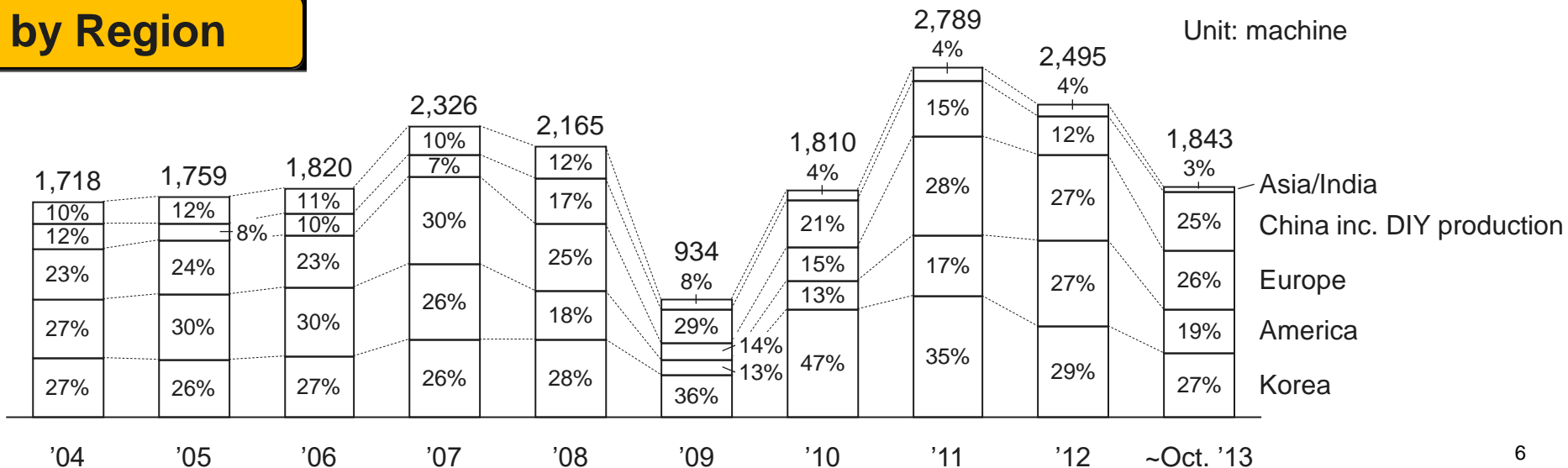
PUMA 8~12inch chuck size sales record

Back-up

by Model



by Region



A. New & upgrade vs. PUMA 240

**B. Outstanding machining performance
vs. PUMA 240**

Global Standard Turning Center

PUMA GT2100/2600 is a Global Standard Turning Center created with DOOSAN's vast experience and technical prowess to become the world's leading turning center on the market.



- New Generation Global Standard 8" & 10" chuck size Turning Center with 2axis or Milling
 - PUM A GT2100 : 8" /10" chuck size New series that is the upgraded model of PUMA 240 series
 - PUMA GT2600 : 10" chuck size New series that is the upgraded model of PUMA 280 series

PUMA GT2100 series _ Concept #2

PUMA 240



2003~2013



Before

DOS

PUMA GT2100



2012~

- 8"/10" chuck size
- New PUMA GT series that is the upgraded model of PUMA 240 series

1



After

2



3



Windows

- Get rid of extra flab,
- Higher rigid & More stable
- Larger specification

- Higher powerful
- Faster

- More convenient

- Outstanding machining performance

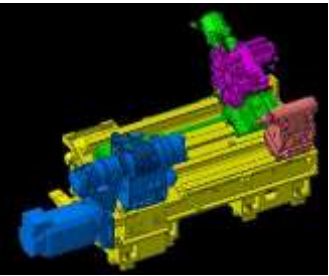
3D video(3m24s)

1



Get rid of extra flab, Higher rigid & More stable

30 degree
slant bed
with box
guideway



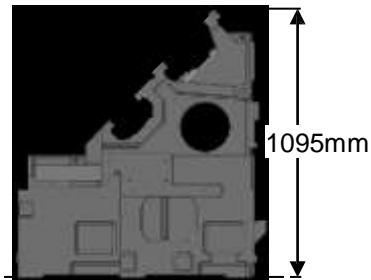
PUMA 240

- Cast design of bed

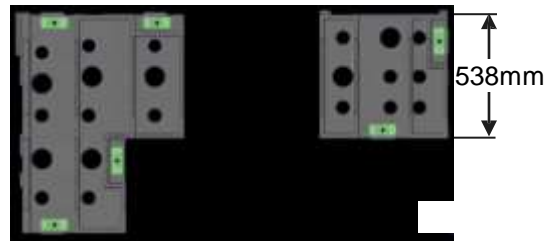


X/Z축 이송계
위치별 박스
가이드웨이 변형

- Slant angle



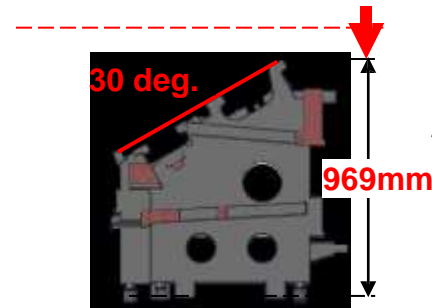
- Bed width



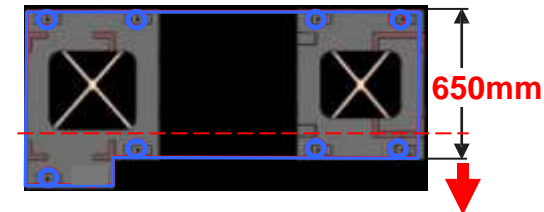
PUMA GT2100



- Cast design optimized with 3D computerized analysis to improve rigidity & stability
- Bed guideway is about 3 times more stable than Previous



- The center gravity of X-axis moving parts is 12% lower than previous

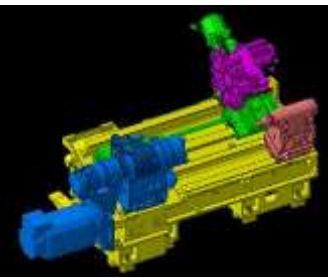


- Bed width is 21% wider than previous
- Increase leveling point 6 to 8



Get rid of extra flab, Higher rigid & More stable

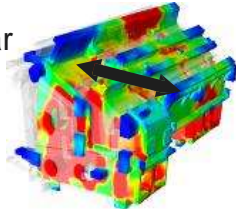
30 degree
slant bed
with box
guideway



PUMA 240

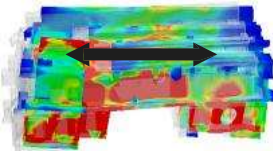
- Bed rigidity based on natural frequency*

–Front to Rear



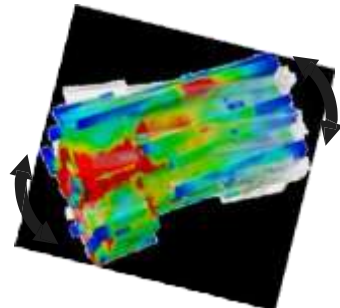
38Hz

–Longitudinal



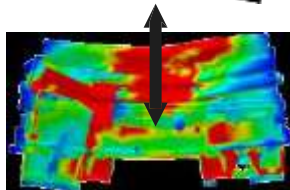
56Hz

–Torsional



78Hz

–Up to Down



115Hz

PUMA GT2100

54Hz, 42% up

68Hz, 21% up

89Hz, 14% up

148Hz, 29% up

- Cast design optimized with 3D computerized analysis has successfully increased natural frequency by as much as 42% compared to previous model. Stable cutting performance with minimized cutting vibration has been achieved in addition to extended tool service life.

* If the natural frequency is higher than previous, more rigid

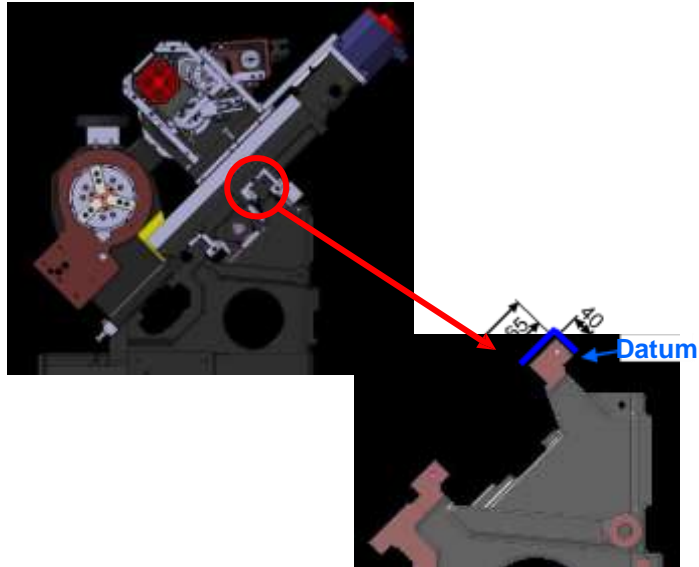
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Get rid of extra flab, Higher rigid & More stable

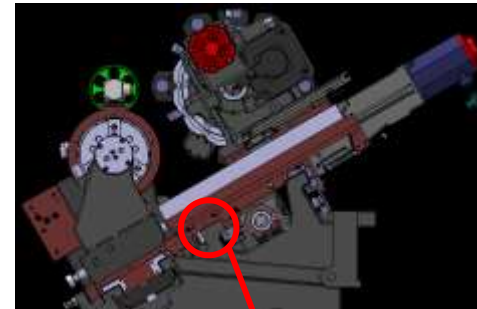
PUMA 240

- Datum guideway



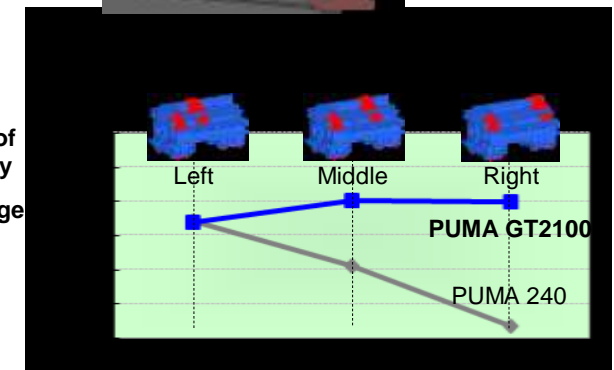
PUMA GT2100

- Datum guideway is closer to spindle than Previous against thermal deformation
- Bed guideway is about 3 times more stable than Previous.



Datum

DEFORMATION of
Datum guide way
Position of carriage

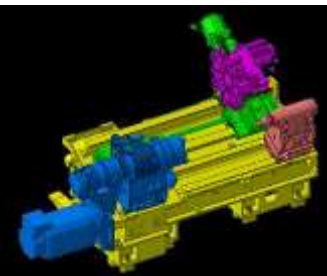


1



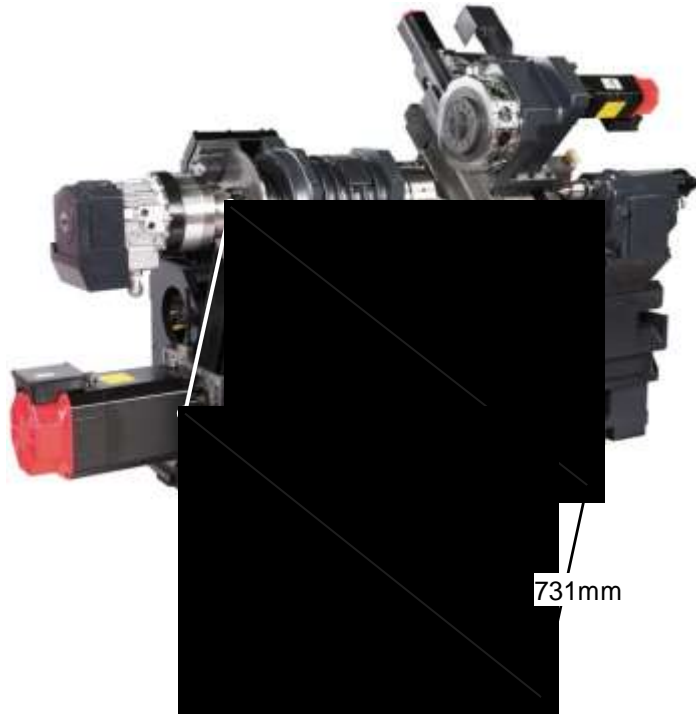
Get rid of extra flab, Higher rigid & More stable

30 degree
slant bed
with box
guideway

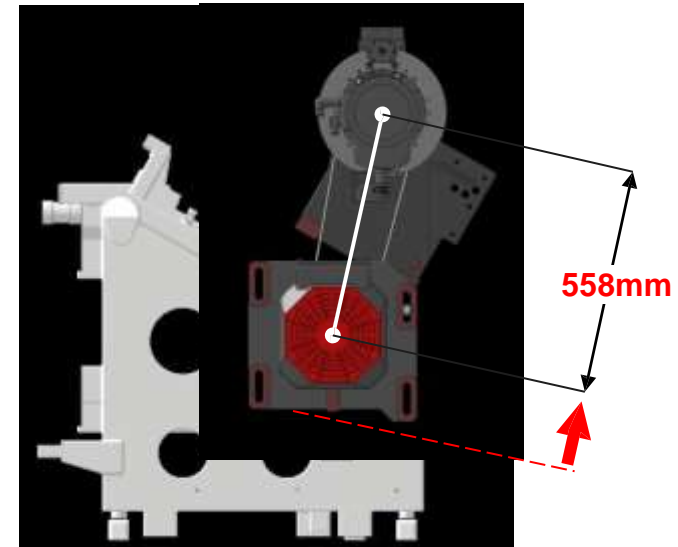


PUMA 240

- Length of spindle belt between driving motor and driven spindle



PUMA GT2100



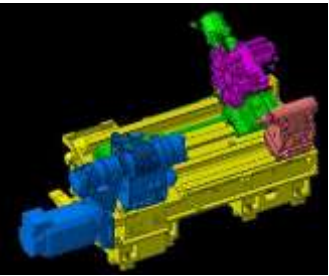
- 24% Shorter than the previous model to minimize the length of spindle belt to decrease belt vibration, belt wear and belt stretch for better milling accuracy with C axis on PUMA GT2100M

1



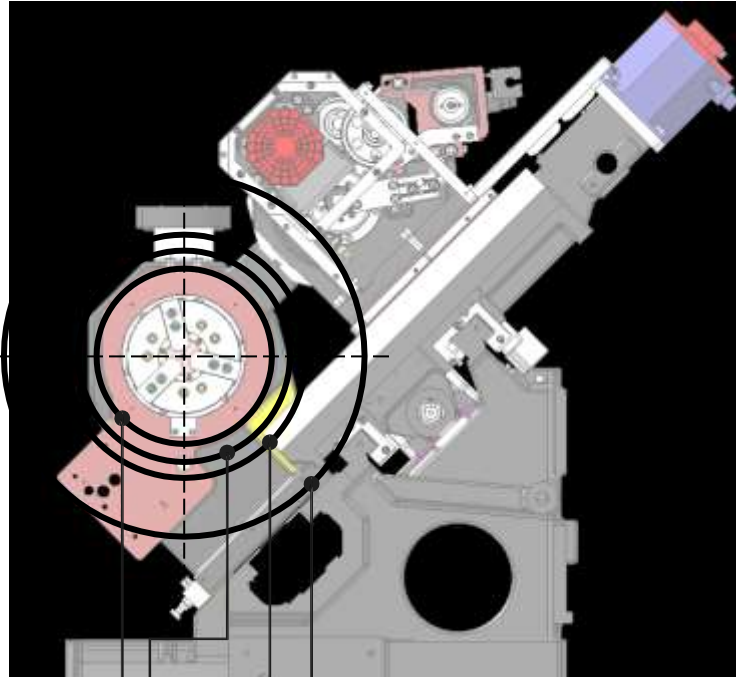
Larger specification

30 degree
slant bed
with box
guideway



PUMA 240

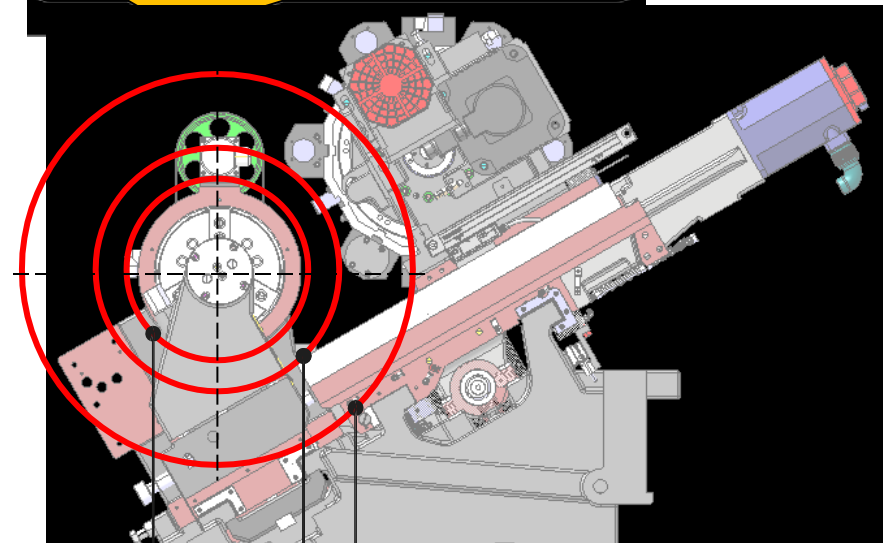
- Turning capacity



Swing over bed: 550mm
Swing over saddle: 390mm
Max. turning diameter of 2axis turret: 350mm
Max. turning diameter of Milling turret: 300mm

PUMA GT2100

- Swing over bed & Max. turning diameter(2axis turret) are 10% larger than previous



Swing over bed: 600mm
Swing over saddle: 390mm
Max. turning diameter of 2axis turret: 390mm
Max. turning diameter of Milling turret: 300mm



Higher powerful, Faster

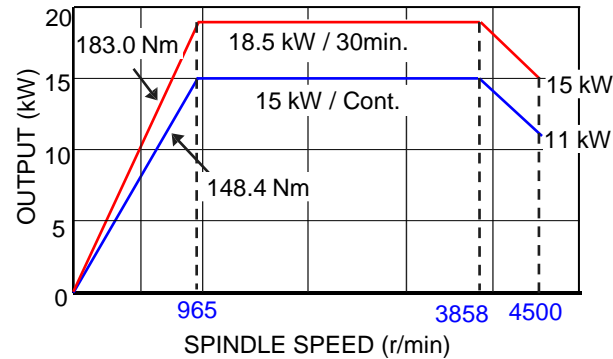
High torque
spindle



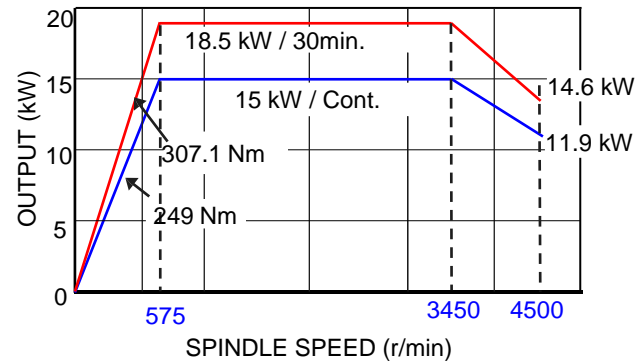
PUMA 240

- Spindle power & torque

–Standard

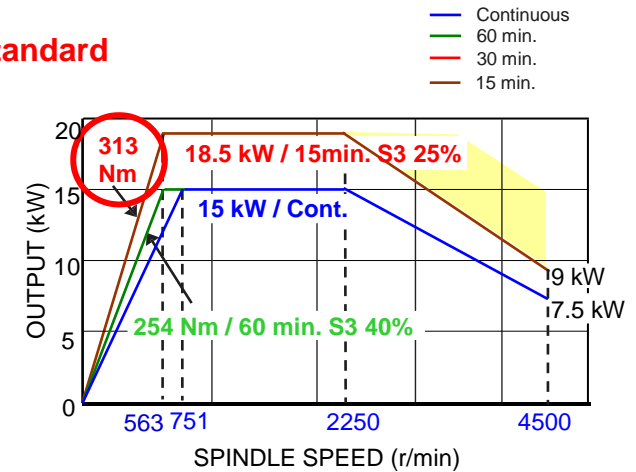


–Option



PUMA GT2100

–Standard



• 71% higher torque spindle than previous for more powerful turning



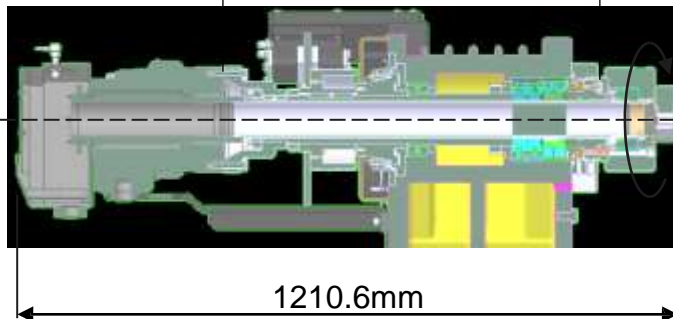
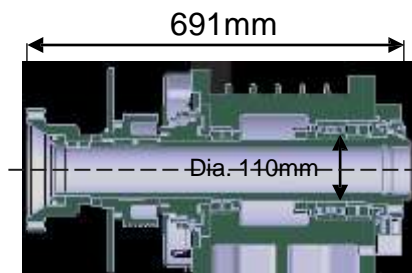
Higher powerful, Faster

Low inertial
spindle



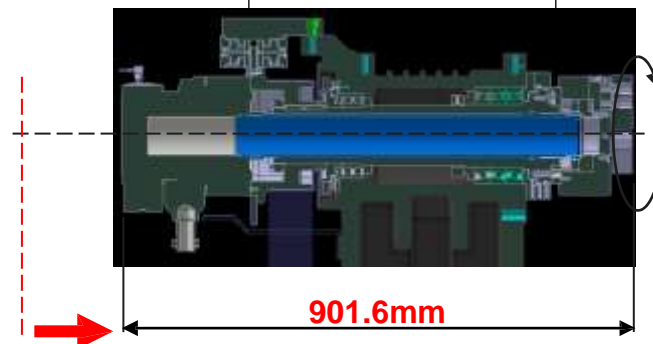
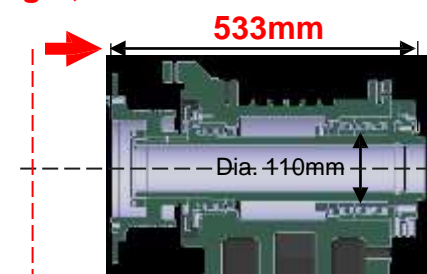
PUMA 240

- Spindle with 2 angular ball bearings + 1 Cylindrical roller bearings on the front side
 - Spindle acceleration(0→Max. r/min) 4.37 sec
 - Spindle deceleration(Max.→0 r/min) 3.38 sec
- Spindle length



PUMA GT2100

- Spindle with 3 angular ball bearings on the front side
 - Spindle acceleration(0→Max. r/min) 3.79 sec
 - Spindle deceleration(Max.→0 r/min) 3.18 sec
- Spindle length, 23% down



- The optimized overhang spindle length
 - ① Lower inertia → Shorten spindle acceleration/deceleration time, Lower vibration & noise
 - ② Lower vibration & noise → Better turning surface, Longer tool life, More comfortable
- New combination of front angular ball bearings
 - ① Lower thermal displacement, high speed performance and rotational precision



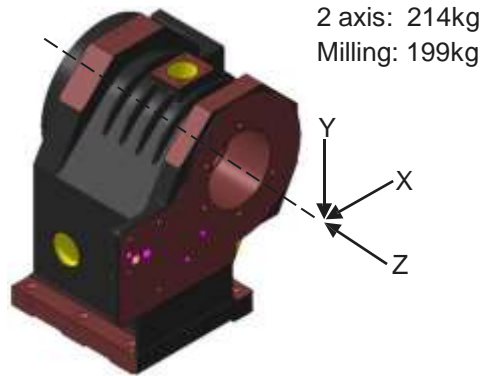
Higher powerful, Faster

High rigid
spindle body



PUMA 240

- Cast design of spindle body



2 axis: 214kg
Milling: 199kg

- Natural frequency*

38Hz

- Static stiffness

X 347 N/ μ m
Y 662 N/ μ m
Z 575 N/ μ m

PUMA GT2100



2 axis: 142kg
Milling: 149kg

941Hz, 55% up

X 351 N/ μ m, 1% up
Y 629 N/ μ m, -5% down
Z 862 N/ μ m, 50% up

- Cast design optimized with 3D computerized analysis has successfully increased natural frequency by as much as 55% and Z axis static stiffness compared to previous models. Stable cutting performance with minimized cutting vibration has been achieved in addition to extended tool service life.

* If the natural frequency is higher than previous, more rigid



Higher powerful, Faster

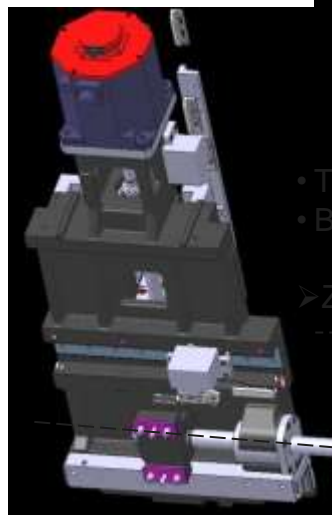
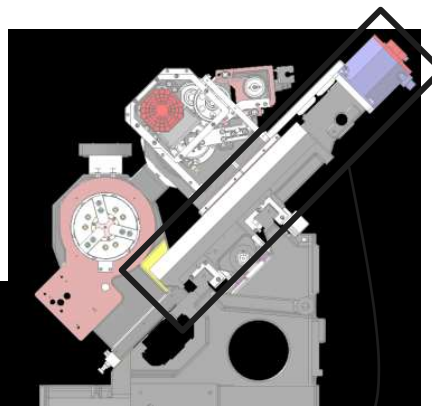
PUMA 240

Big dia. Ball screw for X/Z axis Carriage



- X/Z axis Carriage

125kg



- Thrust force 6.2kN
- Ball screw dia. x lead
 - X axis $\varnothing 28 \times 8 \text{mm}$
 - Z axis $\varnothing 32 \times 10 \text{mm}$

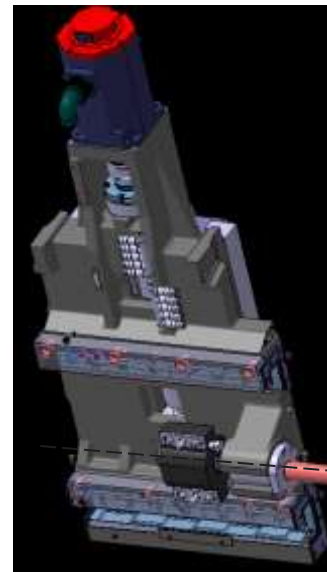
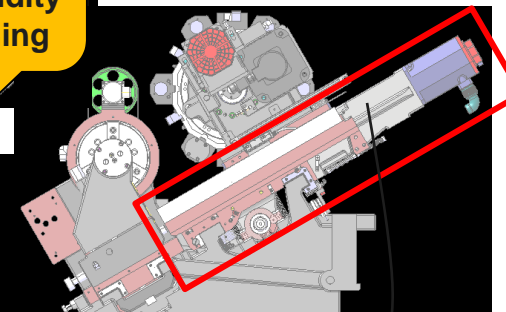


- 1st/2nd Natural frequency* 87/97Hz
- Static stiffness
 - X 55 N/ μm
 - Y 89 N/ μm
 - Z 61 N/ μm

PUMA GT2100

- Big dia. Ball screw for X/Z axis Carriage to increase shaft rigidity during heavy turning

117kg



- Thrust force 6.2kN
- Ball screw dia. x lead
 - X axis $\varnothing 32 \times 10 \text{mm}$
 - Z axis $\varnothing 32 \times 10 \text{mm}$



- 90/100Hz, 3% up
- X 54 N/ μm
- Y 90 N/ μm
- Z 59 N/ μm

- Equivalent natural frequency and static stiffness compared to previous model

* If the natural frequency is higher than previous, more rigid

3

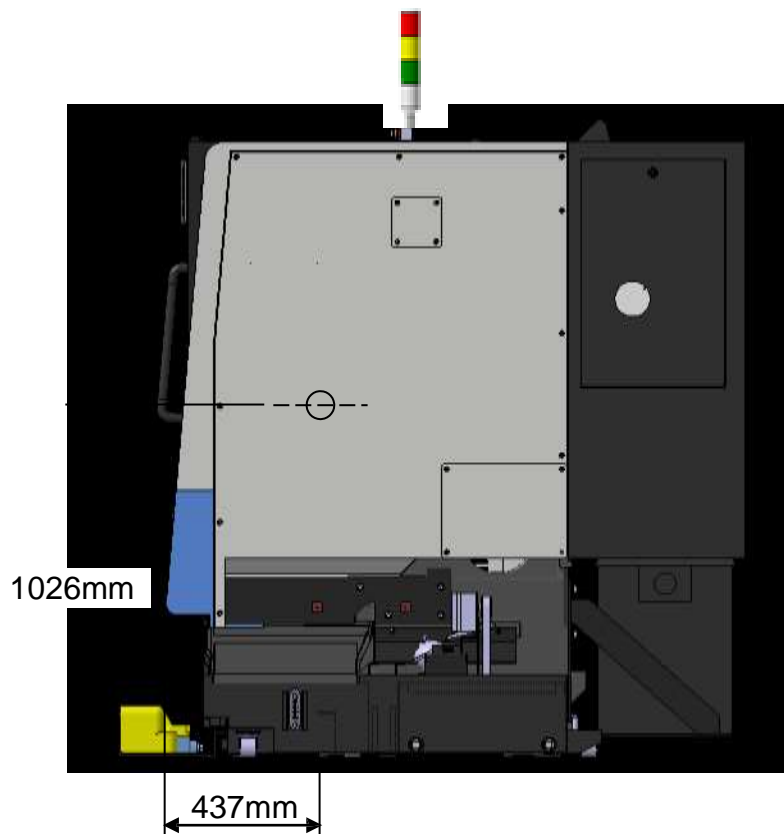
Windows

More convenient

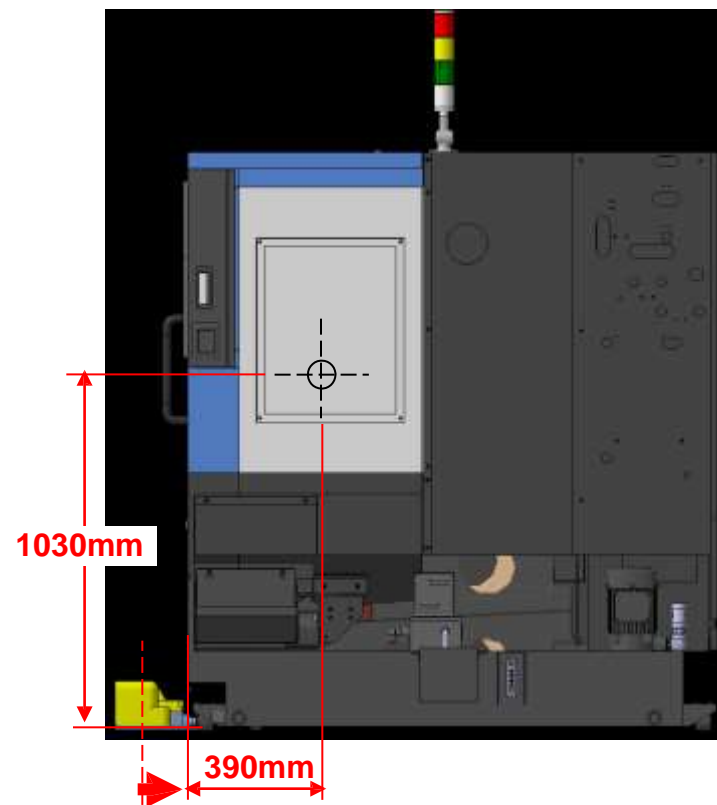
Accessibility

PUMA 240

- Length from front side to chuck center



PUMA GT2100



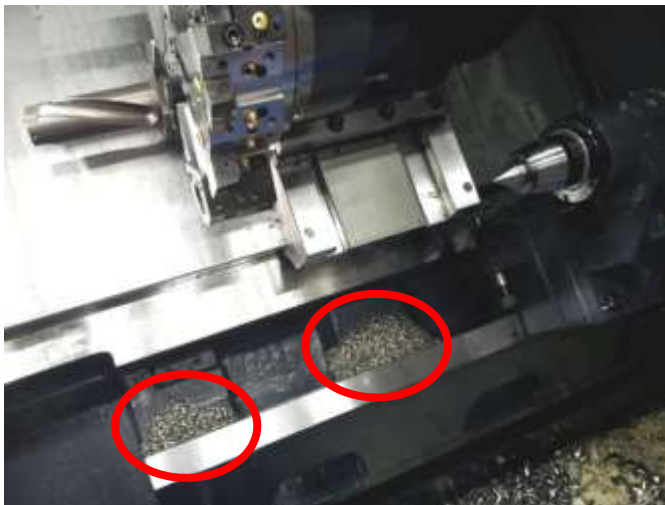
- Access to the chuck & the tool post is optimized for the operator's convenience.

More convenient

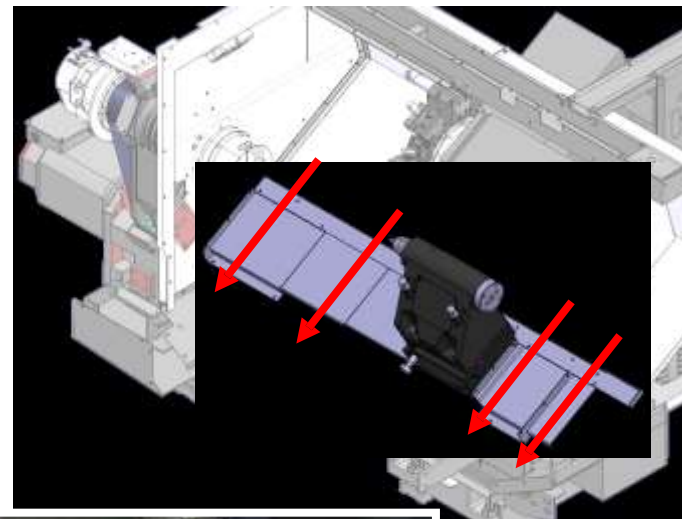
Full sliding cover for tailstock box guideway

PUMA 240

- Sliding cover



PUMA GT2100



- Application of a full cover is to prevent the heat of chips from being transferred to the bed and guideway.
- The guideway can be protected and chips can be removed easily.

More convenient

PUMA 240

**New
operation
panel**

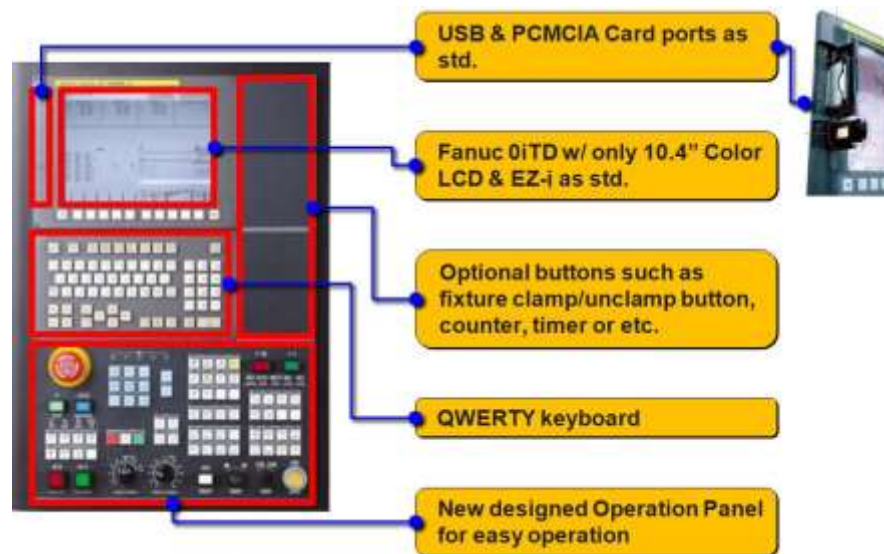


- Operation panel
 - Old type & Fanuc 0iTD with 8.4" Color LCD as standard & EZ-i as option
 - EOP not available



PUMA GT2100

–New OP & Fanuc 0iTD with 10.4" Color LCD & EZ-i for convenience as standard



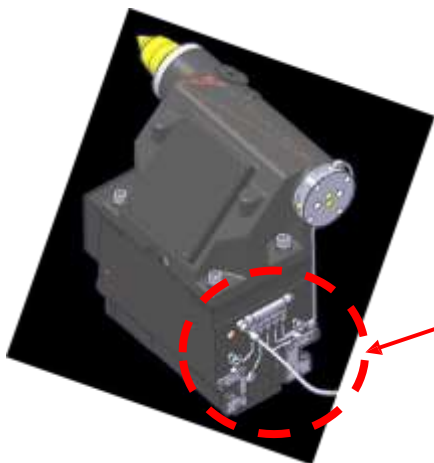
–EOP(Easy Operation Package) as standard

- Tool Load Monitor(std. or opt. by region)
- Back up custom data
- Operation Rate
- G-code list
- M-code list
- Calculator
- Power Saving Function
 - . Auto machine light turn off
 - . Auto machine Sleep
- EZ Functions
 - . EZ Automatic Tail Stock Function
 - . EZ Tool Setter Function

More convenient

PUMA 240

- Tailstock



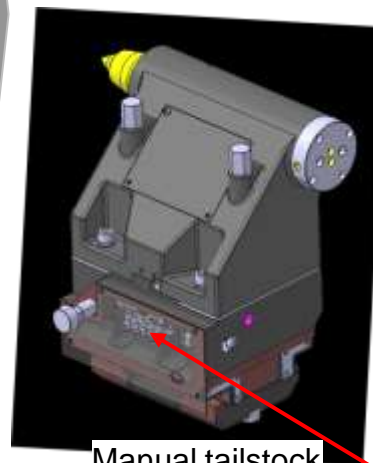
Exposed lubrication line and distributor.



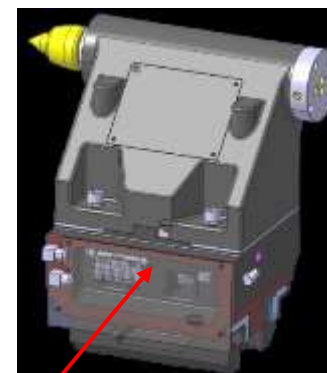
PUMA GT2100



- **EZ function on programmable tailstock**
: Simple tool setter function which memorizes the previous fix position of the tail stock ensuring that the carriage moves to the fixed tail stock position automatically whenever necessary. (EZ automatic tail stock function, EZ tool setter function)



Manual tailstock



Programmable tailstock

- To protect the parts from a possible external damage, all lubrication parts are inside

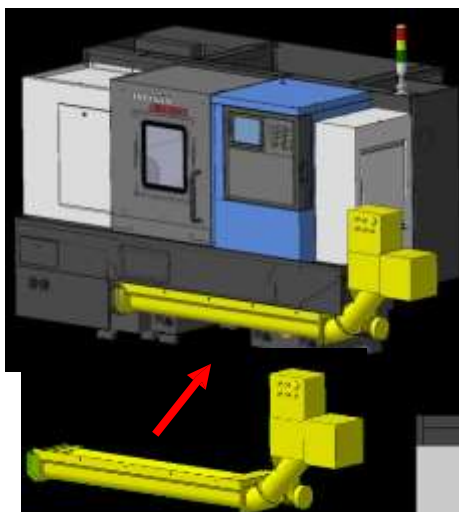
3

Windows

More convenient

Screw type
chip
conveyor

PUMA GT2100



Screw type
chip conveyor
available as
option

When apply screw type chip conveyor, you can save 11% of space compared to hinged type chip conveyor



More convenient

PUMA GT2100

Coolant tank

- Coolant tank capacity
 - PUMA 240 180 liter
 - **PUMA GT2100 190 liter**



Easily clean

- The coolant (cutting fluid) tank can be drawn out without removing the chip pan and conveyor. The user can clean the tank easily.

3

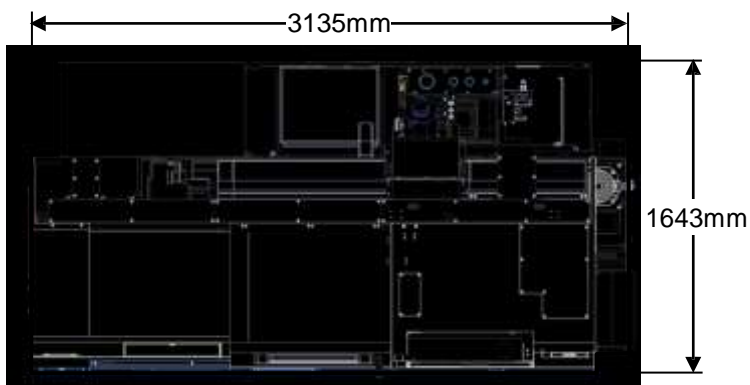
Windows

More convenient

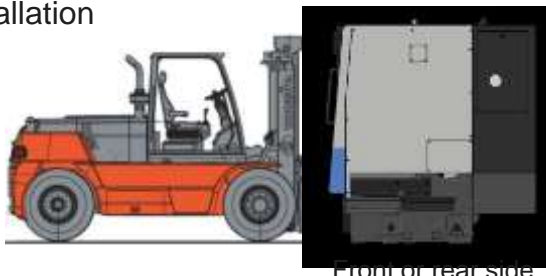
Installation

PUMA 240

- Footprint: 5.2m²



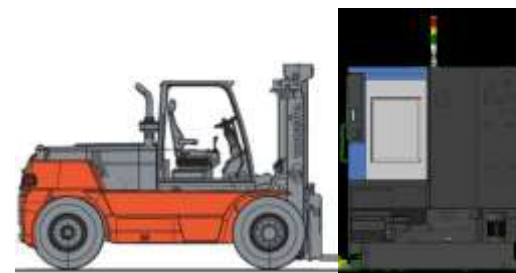
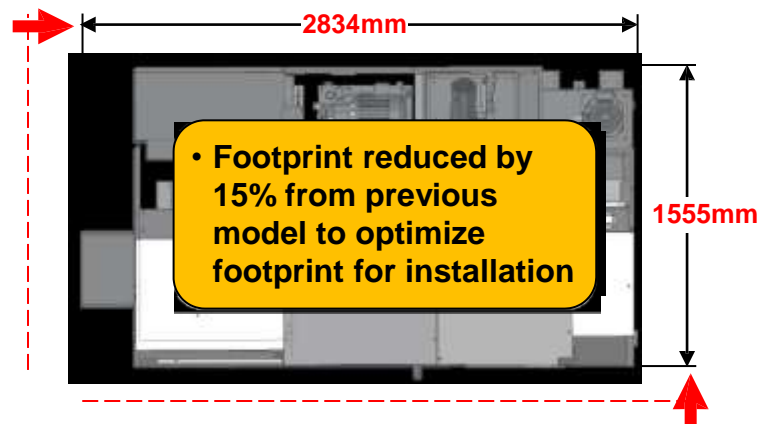
- Installation



Front or rear side

PUMA GT2100

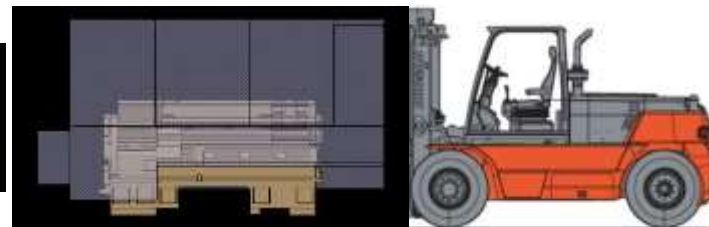
- Footprint: 4.4m², 15% down



Front or rear side

or

Right side



- More convenient to install in narrow factory

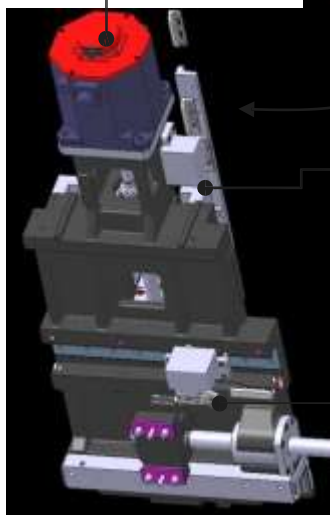
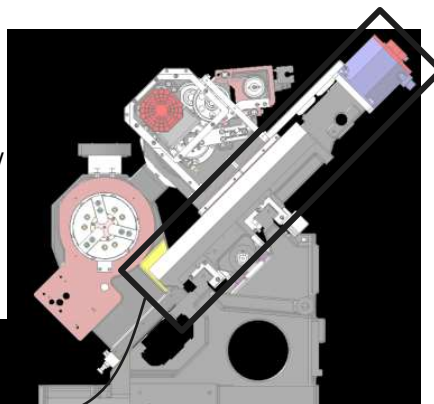
More convenient

PUMA 240

Absolute type servo driven motor for X/Z axis

- X/Z axis Carriage

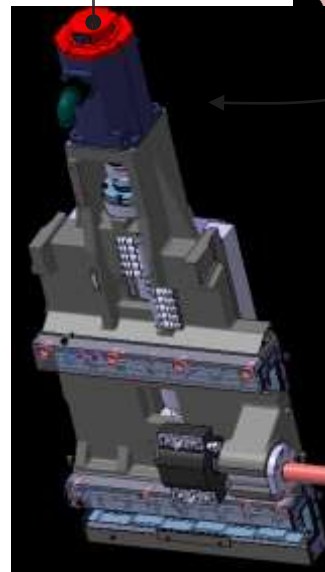
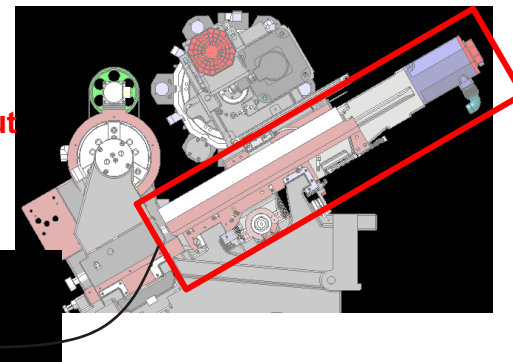
Incremental type servo driven X/Z axis motor with dog/ switches



Dog & switch for X/Z axis

PUMA GT2100

Absolute type servo driven X/Z axis motor without dog/ switches



- To improve convenience, positioning to the 1st reference X/Z axis point to start the machine operation not necessary due to absolute servo driven motor
- Less mechanical error due to servo driven motor



Electric
power

More convenient

PUMA 240

- Halogen work light



- Power consumption of hydraulic unit (2Hr)
– 1.7 kWh

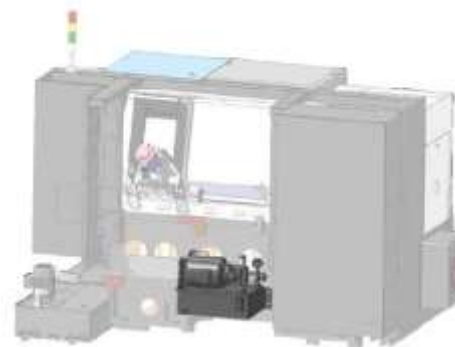
PUMA GT2100

- LED work light with automatic light switch



- LED lamps provide high energy efficiency even at low voltage and have more than 10 times the lifespan of halogen lamps.
- The work light automatically turns off after 10 minutes of no switch operation on the operator's panel.

– 1.3 kWh, 23% down



- Energy-saving, eco-friendly unit is 23% more efficient compared with previous models.



More convenient

Chip cleaning of spindle rotary cylinder

PUMA 240

- Chip cleaning of spindle rotary cylinder
 - Disassembling covers of coolant collector
 - Cleaning coolant collector
 - Assembling covers of coolant collector



PUMA GT2100

–Cleaning coolant collector










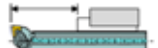
- Easy chip cleaning
- No vibration
- No noise

A. New & upgrade vs. PUMA 240

**B. Outstanding machining performance
vs. PUMA 240**

B. Outstanding machining performance vs. PUMA 240 (1/2)

• Turning of PUMA GT2100/M vs. PUMA 240B

Item	PUMA 240B	PUMA GT2100/M	Comparison
Spindle Power/Torque	18.5kw, 183Nm	18.5kw, 313Nm	Torque 71 % ↑
 <div> U-Drilling Ø 63mm  </div>	• Condition : V=200 m/min (1,010 rpm) • F= 0.13 mm/rev • Chip 410 cm ³ /min • Spindle load 120 %	• F= 0.18 mm/rev • Chip 567 cm ³ /min • Spindle load 120 %	38 % ↑
 <div> Grooving Width 8.0mm  </div>	• Condition : V=150m/min (320 rpm) • F= 0.12 mm/rev • Chip 144 cm ³ /min • Spindle load 115 %	• F= 0.24 mm/rev • Chip 288 cm ³ /min • Spindle load 115 %	100 % ↑
 <div> OD Turning Ø 120mm  </div>	• Condition : V= 210m/min, F= 0.40 mm/rev • Depth 3.0 mm • Chip 252 cm ³ /min • Spindle load 100 %	• Depth 5.0 mm • Chip 420 cm ³ /min • Spindle load 100 %	67 % ↑
 <div> ID Turning Chattering  </div>	• Condition : V= 270m/min, F= 0.3 mm/rev • Tool length 3.5 D • Depth 3.0 mm • NO Chatter	• Tool length 3.5 D • Depth 3.0 mm • NO Chatter	Equivalent

• PUMA GT2100/M

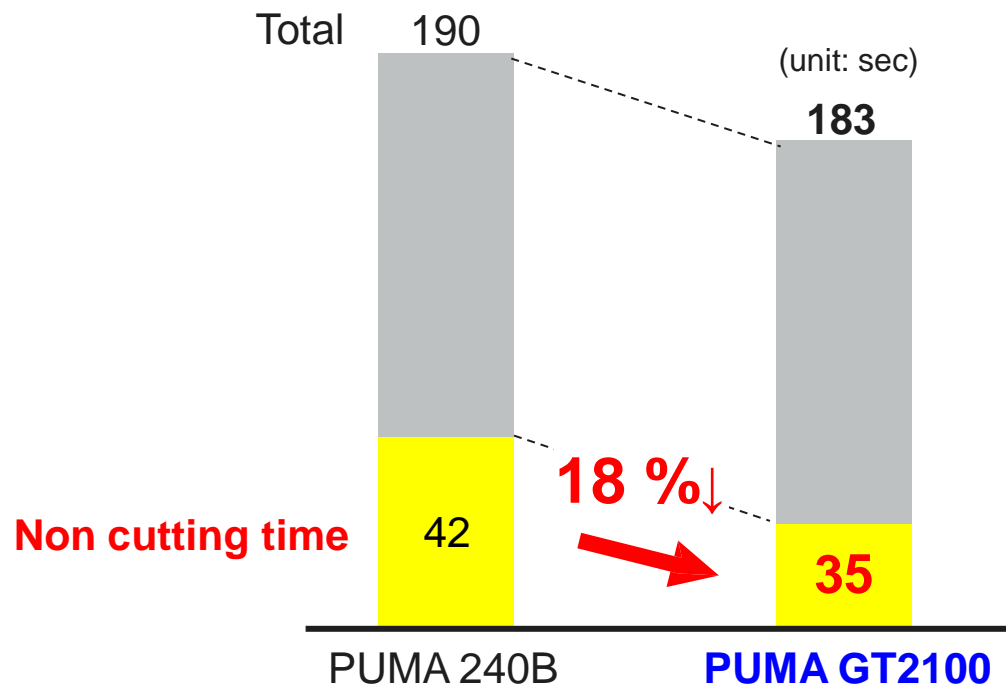
> PUMA 240B

• PUMA GT2100

= PUMA GT2100M

B. Outstanding machining performance vs. PUMA 240

- Productivity of PUMA GT2100M vs. PUMA 240MB



• Non cutting time reduced for high productivity

※Specification vs. competitors

Description			DOOSAN				HYUNDAI-WIA		MAZAK	MORI SEIKI			OKUMA	
			Belt Type		Belt Type		Belt		Built-In Type	Belt/Built in	Belt	Built-In Type	Belt(?)	
			Lynx220LC	PUMA GT2100	PUMA 240B	PUMA 2100	L210 (SKT-21)	L210LSA	QT-SMART 200	NLX2500	DT 310 V1 eco	NL2000	GENOS L250	GENOS L250E
● Capacity	Swing over bed	mm	510	600	550	780	550		660	590	330	923.8	450	450
	Swing over saddle	mm	290	390	390	630	350		343	360	260	755	300	300
	Recom. Turning diameter	mm	210	210	210	210			212	268		275		
	Max. turning diameter	mm	320	390	350	480(406)	350		350	460	228	356	280	280
	Max. turning length	mm	525	562	562	520 / 760	410	530	541/1063	728		510	290	500
	Bar working diameter	mm	65	65	65	65	65		65	80	51	65		
● Main spindle	Spindle speed	r/min	4000	4500	4500	4,500(5,000)	4,000		5,000	3,500(4,000)	5,000	5,000	3,000[4,500]	3,000 [4,500]
	Spindle Torque		167	183(15m-25%)	183	183 [307]	286		233 [358]	446	153	349 [448]	113 at 635	113 at 635
	spindle nose		ASA A2#6	ASA A2#6	ASA A2#6	ASA A2#6	A2-6		ASA A2#6	ASA A2#8	140h5	ASA A2#6	A2-6	A2-6
	Spindle bearing diameter(Front)	mm	110	110	110	120	110		?	130		120		
	Spindle through hole diameter	mm	76	76	76	76	78	78	76	91	69	73	66	66
	Chuck Size	mm(in)	8"	8"	8"	210(8")	8"(210)	8"	8"	10"	8"	8"	8"	8"
● Tail stock	Quill diameter	mm	65	80	80	80	56	-	NCTS	80		80	55	90
	Quill bore taper		MT#4	MT#4	MT#4	MT#4	MT#4	-	MT#5 Dead	MT#5		MT#4	MT#4(L)	MT#5(L)
	Quill travel	mm	80	80	80	80	Motorized	-	565/1075	NC	NC가능)	Servo	80	100
● Travel	X-axis travel	mm	175(15+160)	230(35+195)	242(67+175)	260(72+188)	210		195(15+175+5)	260	160	260	160	160
	Z-axis travel	mm	550	580	580	590 / 830	430	550	560 / 1105	795	442	590	330	520
● Carriage	X-Ball screw dia.x lead	mm	28x10	32x10	28x8	32x10	32x12							
	Z-Ball screw dia.x lead	mm	32x12	32x10	32x10	36x10	32x12							
	Guide way		LMG	Box	Box	Box	LMG (X-Ball, Z-Roller)		LMG	LMG	LMG	BOX		
	Slant angle	deg.	30	30	45	30	45		Step guide	30	45	30		
● Turret	No. of tool stations		12	12	12	12[24]	12		12	10[12]	12	12[10/16/20]	8 [12]	8 [12]
	OD tool size	mm	25	25	25	25	25x25		25	25	25	25	25	25
	Boring bar diameter	mm	40	40	40	40	40	32	40	50	40	Max. 50	40 [32]	40 [32]
	Indexing time(1st swivel time)	s	0.3	0.3	0.3	0.3	0.2		0.17/1 step	0.4	0.6	0.25	0.3	0.3
	Rotary tool spindle speed	r/min	6000	5000	5000	5000	-	4,000	4,500(6,000)	6,000	4,000	6,000	-	-
	Turret Head 폭(2축)		80	80	80	90			80					
	Turret 대면거리 (2축)		350	360	360	410			400					
● Feedrate	Rapid traverse(X/Z-axis)	m/min	30/36	24/30	24/30	30 / 30	36/36		30 / 33	30 / 30	24/30	30 / 30	20/25	20/25
	Rapid traverse(B-axis)	m/min	30	-	30	30	3/6	30	30	20		30		
● Motors	Main spindle motor	kW(Nm)	15/11	18.5/15	18.5/15	18.5/15	15/11(aP22)	15/11(aP22)	15/11[18.5/15]	18.5/15	15/11	15/11[18.5/15]	VAC 7.5/5.5	VAC 7.5/5.5
	Rotary tool spindle motor	kW(Nm)	3.7(24)	5.5(47)	5.5(47)	5.5(47)	-	3.7/2.2	5.5 (47)	5.5 / 3.7(24)	8	5.5 / 3.7(24)	-	-
	Feed motor(X, Z, Y, B-axis)	kW	1.8/1.8/-/-	1.6/3.0/-/-	1.6/3.0/- /1.6	1.6/3.0	3.0/3.0/-/?	3.0/3.0/-/?		X,B: 2.0, Z:3.0		X,B: 2.0, Z:3.5	2.5/2.7	2.5/2.7
	Coolant pump motor	kW	0.4	0.4	0.4	0.4	0.18		0.18	0.4		0.4		
● Machine size	Machine length x Width	mmxmm	2560x1600	2834x1628	3135x1643	3415x1863	2405x1650	3045x1650	2630x1762	2560x1814	3082x1565	2802	1652x1592	2075x1550
	Machine height	mm	1655	1700	1755	1900	1870	1870	1700	1752	1775	2120	1624	1569